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Paper No. 23

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte SUNG S. RHEE

Appeal No. 1998-1386
Application No. 08/269,156

ON BRIEF

Before THOMAS, LALL, and BARRY, Administrative Patent Judges.
BARRY, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on the appeal under 35 U.S.C. § 134 from the final rejection of claims 1, 6-9, 12, 14-17, and 21. We reverse.

BACKGROUND

The invention at issue in this appeal relates to handwriting recognition. Computer-implemented recognition

systems seek to determine the most likely alphanumeric characters written by a user. Such writing is done on a digitizing tablet, which transforms movement of the user's stylus into "ink data." Segmentation processing and context processing have both been used for handwriting recognition. Segmentation processing relates to the shape of a character. Context processing relates to whether a character is meaningful in the literal context of other likely characters.

Speed and accuracy are the primary design considerations for handwriting recognition systems. Speed is affected by how a computer's processing time is allocated to a recognition task. Prior recognition systems postponed the processing of ink data until all of the ink data were provided by a user. Such an approach, however, failed to efficiently use processing time that was available when the computer was collecting ink data.

Speed and accuracy are both affected by the order in which the ink data are processed. Prior recognition systems performed segmentation processing first, followed by context

processing. In such sequential processing, however, the segmentation processing took place with limited information, without reference to context information that could help in determining the most likely characters. Commencing with characters determined by a segmentation process based on limited information, moreover, correspondingly hindered the accuracy of the context processing.

The invention at issue in this appeal integrates segmentation and context processing into a two-pass searching process. First, a dynamic programming path search performs all the segmentation processing and most of the context processing while the user is still writing. Accordingly, the context processing is not delayed until after all ink data are collected. Second, a stack-based path search completes the context processing after all the ink data are received.

Claim 1, which is representative for our purposes, follows:

1. A method of processing data that represents strokes of handwritten information, thereby to identify characters represented by the data, the method comprising the steps of:

receiving the data provided by a user, the data having a beginning part and an end part that define therebetween a complete amount of handwritten information to be processed;

assembling portions of the data into a sequence of packages; and

determining for the sequence of packages a probable result set of characters represented by the sequence, the determining step occurring before the end part of the data is received and comprising the steps of simultaneously considering information pertaining to the character shapes represented by the packages and information pertaining to the literal context of the characters represented by the packages;

wherein the determining step includes searching for the result set of characters from among a plurality of character candidates using a first search technique; and

wherein the first of two search techniques comprises the steps of:

developing for each package at least one path representing a string of character candidates, each path having a respective beginning and a respective end; and

generating for each path a first cost value that reflects the probability that the path includes the result set of characters, the first cost value being based upon information pertaining to the character shapes represented by the packages and information pertaining to the literal context of the characters represented by the packages and

wherein the second of the two search techniques assigns a second cost value to a considered path based upon the literal context of the considered path, and wherein the second search technique conducts a reverse search towards the respective beginning of at least some of the paths developed by the first

search technique to identify the result set as a path having the lowest of the combined first and second cost values.

The references relied on in rejecting the claims follow:

Guyon et al. (Guyon)	5,105,468	Apr. 14,
1992		
Hullender	5,151,950	
Sept. 29, 1992		
Fujisaki et al. (Fujisaki)	5,392,363	Feb. 21,
1995		
	(filed Nov. 13,	
1992).		

Claims 1, 6-9, 12, 14, 15, 17, and 21 stand rejected under 35 U.S.C. § 112, ¶ 1, as lacking a written description and as non-enabled. Claims 1, 6, 8, 12, 14-17, and 21 stand rejected under 35 U.S.C. § 102(e) as anticipated by Fujisaki. Claim 9 also stands rejected under 35 U.S.C. § 103 as obvious over Fujisaki in view of Guyon. Claims 1, 6, and 9 also stand rejected under 35 U.S.C. § 102(b) as anticipated by Hullender. Rather than repeat the arguments of the appellant or examiner in toto, we refer the reader to the briefs and answers for the respective details thereof.

OPINION

In reaching our decision in this appeal, we considered the subject matter on appeal and the rejections advanced by the examiner. Furthermore, we duly considered the arguments and evidence of the appellant and examiner. After considering the totality of the record, we are persuaded that the examiner erred in rejecting claims 1, 6-9, 12, 14-17, and 21. Accordingly, we reverse. Our opinion addresses the following issues:

- written description and enablement of claims 1, 6-9, 12, 14, 15, 17, and 21
- anticipation of claims 1, 6, 8, 12, 14-17, and 21 by Fujisaki
- obviousness of claim 9 over Fujisaki in view of Guyon
- anticipation of claims 1, 6, and 9 by Hullender.

Written Description and Enablement of Claims 1, 6-9, 12, 14, 15, 17, and 21

The examiner's explanation of an arguments about the rejection of claims 1, 6-9, 12, 14, 15, 17, and 21 under 35 U.S.C. § 112 confuses the written description and enablement requirements of the statute. By way of clarification, we note the following principles from Vas-Cath, Inc. v. Mahurkar,

935 F.2d 1555, 1563, 19 USPQ2d 1111, 1117 (Fed. Cir. 1991).

35 U.S.C. § 112, first paragraph, requires a "written description of the invention" which is separate and distinct from the enablement requirement. The purpose of the "written description" requirement is broader than to merely explain how to "make and use"; the applicant must also convey with reasonable clarity to those skilled in the art that, as of the filing date sought, he or she was in possession of *the invention*.

With these principles in mind, we separately and distinctly address the written description and enablement of the claims.

Written Description of the Claims

Regarding the written description of claims 1, 6-9, 12, 14, 15, 17, and 21, the examiner asserts, "Appellant does not have adequate support in the disclosure for a second search technique performed subsequent to a first search techniques wherein both search techniques consider information pertaining to both character shapes and literal context of the characters." (Supplemental Examiner's Answer at 4.) The appellant's reply follows.

The First Search

As depicted in Fig. 7 and explained, for example, on page 13, lines 23-28, the first search considers character least-cost values for symbols corresponding to the node (i.e., character) under consideration. This is character shape information. In the next steps of the search, the first search considers, for example, trigram least-cost values for the node. This is literal context information.

The Second Search

Inasmuch as the second search (the SBP search, see Fig. 8) considers the path cost established by the first search (see, for example, page 14, lines 24-28), it inherently considers character shape, which made up part of the first search. The

dictionary values added by the second search (see page 14, line 28, through page 15, line 10) provides literal context, in addition to the literal context of the first search (such as the trigram).
(Substitute Reply Br. at 2-3.)

"To fulfill the written description requirement, the patent specification 'must clearly allow persons of ordinary skill in the art to recognize that [the inventor] invented what is

claimed.'" Gentry Gallery, Inc. v. Berkline Corp.,
134 F.3d 1473, 1479, 45 USPQ2d 1498, 1503 (Fed. Cir. 1998)
(quoting In re Gosteli, 872 F.2d 1008, 1012, 10 USPQ2d 1614,
1618 (Fed. Cir. 1989)). Fulfillment of the requirement is
adjudged "as of the filing date" of the associated patent
application. Vas-Cath, Inc. v. Mahurkar, 935 F.2d at 1566, 19
USPQ2d at 1119. "[T]he PTO has the initial burden of
presenting evidence or reasons why persons skilled in the art
would not recognize in the disclosure a description of the
invention defined by the claims.'" Gosteli, 872 F.2d at 1012,
10 USPQ2d at 1618 (quoting In re Wertheim, 541 F.2d 257, 263,
191 USPQ 90, 97 (CCPA 1976)).

Here, the examiner fails to show that the original
specification, which includes the original claims, does not
describe "a second search technique performed subsequent to a
first search techniques wherein both search techniques
consider information pertaining to both character shapes and
literal context of the characters." (Supplemental Examiner's
Answer at 4.) To the contrary, the specification discloses
two search techniques: "one of the two search techniques,

designated DPP," (Spec. at 4), and "the second of the two search techniques, designated SBP" (Id.) Figure 6 of the specification shows that the SBP search (234) is performed after the DPP search (200).

The specification also reveals that the DPP search considers information pertaining to both character shape and literal context. Specifically, the "DPP retrieves for the node under consideration the character least-cost value " ... for the symbol that now comprises the node under consideration." (Spec. at 13.) The least-cost value pertains to character shape. The DPP search also retrieves "the cost value, \$, representing the trigram least-cost value ... for the path node under consideration." (Id.) The trigram least-cost value pertains to literal context.

Furthermore, the specification reveals that the SBP search considers information pertaining to both character shape and literal context. Specifically, "the SBP search first retrieves the nodes that occur at each end of the DPP

paths (that is, the dynamic programming search paths established by the DPP object as mentioned above)." (Spec. at 14.) By retrieving the path cost established by the DPP search, the SBP search inherently considers character shape, which constituted part of the DPP search. "The SBP object ... consults the system dictionary and any application-supplied wordlist for determining whether the transition from one node to another yields a character string from the end node that is valid" (Id. at 14-15.) The dictionary values pertain to literal context.

In view of these disclosures, we are not persuaded that persons skilled in the art would not recognize in the disclosure a description of the invention defined by the claims. The examiner has not met his initial burden. Therefore, we reverse the rejection of claims 1, 6-9, 12, 14, 15, 17, and 21 as lacking a written description. Next, we address the enablement of the claims.

Enablement of the Claims

Regarding the enablement of claims 1, 6-9, 12, 14, 15, 17, and 21, the examiner asserts, "there is no support for any search technique, other than in the 'Summary of the Invention', that adequately teaches and supports 'a' search technique that uses both or either of the two, information pertaining to character

shapes and literal context. No details are provided and their implementation would require excessive experimentation or delay" (Supplemental Examiner's Answer at 5.) The appellant's reply follows.

[T]he specification, beginning on page 17, line 1 explains that the present invention can be implemented using a variety of different computer systems, such as a personal computer using an Intel 66 MHZ 80486 microprocessor, running on Microsoft Windows 3.1 operating system. Also provided in the specification is a list of exemplary data structures and functions that may be employed in programming in C language a digital computer to perform the functions described in the specification and diagrammed in step-by-step detail in Figs. 3 through 9. (Appeal Br. at 26-27.)

To fulfill the enablement requirement, a specification must contain a description that enables one skilled in the art to make and use the claimed invention. That some experimentation is necessary does not preclude enablement. All that is required is that experimentation not be unduly extensive. Atlas Powder Co. v. E. I. Du Pont de Nemours & Co., 750 F.2d 1569, 1576, 224 USPQ 409, 413 (Fed. Cir. 1984). "[T]he PTO bears an initial burden of setting forth a reasonable explanation as to

why it believes that the scope of protection provided by that
claim is

not adequately enabled by the description of the invention provided in the specification of the application" In re Wright, 999 F.2d 1557, 1561-62, 27 USPQ2d 1510, 1513 (Fed. Cir. 1993) (citing In re Marzocchi, 439 F.2d 220, 223-24, 169 USPQ 367, 369-70 (CCPA 1971)).

Here, the examiner fails to set forth a reasonable explanation why the scope of protection provided by the claims is not adequately enabled by the specification. Even before the invention, computer-implementations of segmentation processing and context processing were known in the art of handwriting recognition. (Spec. at 1-2.) Turning to the invention, the specification explains that the invention can be implemented on a platform comprising "a personal computer using an Intel 66 MHZ 80486 microprocessor, running the Microsoft Windows 3.1 operating system." (Id. at 17.) Figures 3-9 of the specification show detailed flow charts of the functions described to be performed by such a computer. The specification also lists "exemplary data structures and functions that may be employed in programming in C language" the computer to perform the functions. (Id.)

In view of the prior implementations and the appellant's flow charts, data structures and functions, and platform explanation, we are not persuaded that the specification would not enable one skilled in the art to make and use the claimed invention without undue experimentation. The examiner has not met his initial burden. Therefore, we reverse the rejection of claims 1, 6-9, 12, 14, 15, 17, and 21 as non-enabled. Next, we address the anticipation of claims 1, 6, 8, 12, 14-17, and 21 by Fujisaki.

Anticipation of Claims 1, 6, 8, 12, 14-17, and 21 by Fujisaki

We begin by noting the following principles from Rowe v. Dror, 112 F.3d 473, 478, 42 USPQ2d 1550, 1553 (Fed. Cir. 1997).

A prior art reference anticipates a claim only if the reference discloses, either expressly or inherently, every limitation of the claim. See Verdegaal Bros., Inc. v. Union Oil Co., 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). "[A]bsence from the reference of any claimed element negates anticipation." Kloster Speedsteel AB v. Crucible, Inc., 793 F.2d 1565, 1571, 230 USPQ 81, 84 (Fed. Cir. 1986).

With these in mind, we address the appellant's argument that "Fujisaki ... cannot be fairly considered as *simultaneously*

considering character shape and context information"

(Appeal Br. at 8.)

Claims 1, 6, and 8, each specify in pertinent part the following limitations: "the determining step ... comprising the steps of simultaneously considering information pertaining to the character shapes represented by the packages and information pertaining to the literal context of the characters represented by the packages." Similarly, claims 16 and 17 each specify in pertinent part the following limitations: "search means for selecting the result by substantially simultaneously considering the shape and literal content of the character hypotheses" In summary, claims 1, 6, 8, 16, and 17 each recite simultaneously or substantially simultaneously considering character shape and context information.

The examiner fails to show a teaching of the claimed limitations. "The Patent Office has the initial duty of supplying the factual basis for its rejection. It may not ...

resort to speculation, unfounded assumptions[,] or hindsight reconstruction to supply deficiencies in its factual basis."

In re Warner, 379 F.2d 1011, 1017, 154 USPQ 173, 178 (CCPA 1967).

Fujisaki does teach considering both character shape and context information. Regarding the former, the reference mentions, "a Frame Shape Recognizer, associates conditional probabilities to each frame" Col. 13, ll. 67-68. Regarding the latter, the reference states, "The language model block 26 provides language model probabilities which may be used to determine what characters are most likely to occur in a given context, or what words are most likely to occur in a given context." Col. 9, ll. 23-27.

The examiner does not show, however, that the Frame Shape Recognizer and the language model block operate substantially simultaneously, let alone simultaneously. To the contrary, Fujisaki suggests that the components operate sequentially. Specifically, the reference characterizes the Frame Shape Recognizer as one of the "pre-processing components" Col. 13, ll. 63-66. Such a characterization implies that the Frame Shape Recognizer operates before the processing of the language model block.

In view of this characterization, we are not persuaded that the reference discloses the claimed limitation of simultaneously or substantially simultaneously considering character shape and context information. The absence of this disclosure negates anticipation.

Regarding claims 1, 6, 8, 12, 14, 15, and 21, the appellant argues, "traversal of the vocabulary trie from the leaves back towards the root pertains to construction of the vocabulary trie and not with reverse searching of paths that comprise character hypotheses corresponding to received ink data." (Appeal Br. at 14.) The examiner replies, "Fujisaki et al clearly teach the paths are reversed-searched (traversed) in a direction opposite to the direction the data was received (from the leaves back to the root) in column 19, line 67-column 20, line 1." (Examiner's Answer at 15.)

Claims 1, 6, and 8, each specify in pertinent part the following limitations: "the second search technique conducts a reverse search towards the respective beginnings of at least some of the paths developed by the first search technique

...." Similarly, claims 12, 15, 15, and 21 each specify in pertinent part the following limitations: "reverse-searching the constructed paths in a direction opposite to the direction the data was received." In summary, claims 1, 6, 8, 12, 14, 15, and 21 each recite reverse-searching paths that comprise character hypotheses corresponding to received data.

The examiner fails to show an unambiguous teaching of the claimed limitations. The passage of Fujisaki relied on by the examiner merely states, "Next, the trie is traversed from the leaves back towards the root, summing the frequencies at each d-node." Col. 19, l. 67, - col. 20, l. 1. The passage is ambiguous at best. The passage possibly could be interpreted as teaching reverse-searching paths that comprise character hypotheses corresponding to received data. It also could be interpreted, however, as teaching building a vocabulary trie.

In view of the ambiguity, the examiner's interpretation amounts to speculation or an unfounded assumption. Accordingly, we are not persuaded that the reference discloses the claimed limitation of reverse-searching paths that

comprise character hypotheses corresponding to received data. The absence of the disclosure negates anticipation. Therefore, we reverse the rejection of claims 1, 6, 8, 12, 14-17, and 21 as anticipated by Fujisaki. Next, we address the obviousness of claim 9 over Fujisaki in view of Guyon.

Obviousness of Claim 9 over Fujisaki in view of Guyon

We begin by noting the following principles from In re Rijckaert, 9 F.3d 1531, 1532, 28 USPQ2d 1955, 1956 (Fed. Cir. 1993).

In rejecting claims under 35 U.S.C. § 103, the examiner bears the initial burden of presenting a prima facie case of obviousness. In re Oetiker, 977 F.2d 1443, 1445, 24 USPQ2d 1443, 1444 (Fed. Cir. 1992).... "A prima facie case of obviousness is established when the teachings from the prior art itself would appear to have suggested the claimed subject matter to a person of ordinary skill in the art." In re Bell, 991 F.2d 781, 782, 26 USPQ2d 1529, 1531 (Fed. Cir. 1993) (quoting In re Rinehart, 531 F.2d 1048, 1051, 189 USPQ 143, 147 (CCPA 1976)). If the examiner fails to establish a prima facie case, the rejection is improper and will be overturned. In re Fine, 837 F.2d 1071, 1074, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988).

Like claims 1, 6, and 8, claim 9 recites simultaneously considering character shape and context information and also

reverse-searching paths that comprise character hypotheses
corresponding to received data.

The examiner fails to show a teaching or suggestion of the claimed limitation. As mentioned regarding the anticipation by Fujisaki, the examiner has not shown that Fujisaki teaches the claimed limitations. He likewise has not shown that the reference would have suggested the limitations. The examiner also fails to allege, let alone show, that Guyon remedies the defects of Fujisaki.

Accordingly, we are not persuaded that teachings from the prior art would appear to have suggested the claimed limitation of simultaneously considering character shape and context information and also reverse-searching paths that comprise character hypotheses corresponding to received data. Therefore, we reverse the rejection of claim 9 over Fujisaki in view of Guyon. Next, and last, we address the anticipation of claims 1, 6, and 9 by Hullender.

Anticipation of Claims 1, 6, and 9 by Hullender

Regarding the anticipation of claims 1, 6, and 9 by Hullender, the appellant argues, "In Hullender, there is no searching in reverse (relative to another search)"

(Substitute Reply Br. at 6.) The examiner replies, "in col. 7, lines 20-21, Hullender teaches comparing two character hypotheses by probability in reverse order"

(Supplemental Examiner's Answer at 3.)

As mentioned regarding the anticipation by Fujisaki and the obviousness over Fujisaki in view of Guyon, claims 1, 6, and 9 each recite reverse-searching paths that comprise character hypotheses corresponding to received data. The examiner fails to show an unambiguous teaching of the claimed limitations. The passage of Hullender relied on by is a comment in a program listing that merely states, "/* Routine to compare two hypotheses by probability for qsort in reverse order (most probable first)[.] */" Col. 7, ll. 20-21. The passage is ambiguous at best. The passage possibly could be interpreted as teaching reverse-searching paths that comprise character hypotheses corresponding to received data. It also could be interpreted, however, as teaching sorting hypotheses probabilities, i.e., most probable first.

In view of the ambiguity, the examiner's interpretation amounts to speculation or an unfounded assumption. Accordingly, we are not persuaded that the reference discloses the claimed limitation of reverse-searching paths that comprise character hypotheses corresponding to received data. The absence of the disclosure negates anticipation. Therefore, we reverse the rejection of claims 1, 6, and 9 as anticipated by Hullender.

CONCLUSION

To summarize, the rejection of claims 1, 6-9, 12, 14, 15, 17, and 21 under 35 U.S.C. § 112, ¶ 1, as lacking a written description is reversed. The rejection of claims 1, 6-9, 12, 14, 15, 17, and 21 under 35 U.S.C. § 112, ¶ 1, as non-enabled is reversed. The rejection of claims 1, 6, 8, 12, 14-17, and 21 under 35 U.S.C. § 102(e) as anticipated by Fujisaki is reversed. The rejection of claim 9 under 35 U.S.C. § 103 as obvious over Fujisaki in view of Guyon is reversed. The rejection of claims 1, 6, and 9 under 35 U.S.C. § 102(b) as anticipated by Hullender is reversed.

REVERSED

JAMES D. THOMAS)	
Administrative Patent Judge)	
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)	BOARD OF PATENT
PARSHOTAM S. LALL)	APPEALS
Administrative Patent Judge)	AND
)	INTERFERENCES
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